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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/726,521	12/04/2003	Young-Ho Lee	1349.1298	7200
21171 7590 06/19/2007 STAAS & HALSEY LLP SUITE 700 1201 NEW YORK AVENUE, N.W. WASHINGTON, DC 20005			EXAMINER WERNER, DAVID N	
			ART UNIT 2621	PAPER NUMBER
			MAIL DATE 06/19/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/726,521

Applicant(s)

LEE, YOUNG-HO

Examiner

David N. Werner

Art Unit

2621

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 May 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. The location of your application in the USPTO has changed. To aid in correlating any papers for this application, all further correspondence regarding this application should be directed to Art Unit 2621.
2. This Office action is in response to the Request for Continued Examination filed 29 May 2007. Currently, claims 1-10 are pending.

Continued Examination Under 37 CFR 1.114

3. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 29 May 2007 has been entered.

Response to Arguments

4. Applicant's arguments with respect to claims 1-10 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 8 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by US Patent 6,285,711 B1 (Ratakonda et al.). Ratakonda et al. teaches a method of estimating motion vectors by estimating a first motion vector component, displacing a search area according to the first component, and estimating a second motion vector component from the displaced search area. Regarding claim 8, figure 2 shows the first embodiment of the method of Ratakonda et al. First, the vertical motion components of target image 36 with image block 38 are estimated from the row average vectors from source image 32 with image block 34. "The search area is then vertically displaced according to the estimated vertical motion. The remaining, second, motion component (here the horizontal motion) is then estimated in the second iteration in target image 40, having image block 42, once the new target average vector (here the column average vectors) has been computed" (column 6, lines 24-37).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda et al. Claim 1 of the present invention is an apparatus claim for an apparatus that performs the method of claim 8. Ratakonda et al. mainly discusses a method, and only briefly mentions physical implementations and applications of the method described therein (column 9, lines 18-56). However, it would have been obvious to one having ordinary skill in the art at the time the invention was made, to build an actual implementation of the method of Ratakonda et al., since Ratakonda et al. states in column 1, lines 64-67 that such a physical embodiment would enable consumer devices to rapidly produce motion estimation fields with minimum hardware costs.

9. Claims 2, 5, 9, and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda et al. in view of "Efficient Block Motion Estimation Using Integral Projection" (Sauer et al.) Regarding claim 9, in Ratakonda et al., the vertical motion component is calculated by minimizing the sum of absolute difference between the source row average vector and the target row average vector (column 5, lines 61-65). The source row average vector is calculated using the integral projection method from source image 32, and the target row average vector is calculated using the integral projection method from target image 36. Regarding claim 10, horizontal motion is estimated by minimizing a cost function (like sum of absolute differences) between the source column average vector and the target column average vector, calculated with

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integral projection (column 5, line 65–column 6, line 1). Since the search area has been vertically displaced according to the vertical motion, the target column average vector is found from target image 40 (column 6, lines 33-37). The integral projection method (IPM) includes a step of adding the values of pixels of each row to create vertical sums, or a step of adding the values of pixels of each row to create horizontal sums.

However, Ratakonda et al. does not make this very clear.

Sauer et al. demonstrates a motion estimation technique with Integral Projection, and explains IPM more thoroughly than Ratakonda et al. In the IPM described by Sauer et al., a block of K-by-K pixels in a search area is transformed into two vectors of length K. Each entry in the vertical projection vector is formed by summing pixel values in the corresponding row, and each entry in the horizontal projection vector is formed by summing pixel values in the corresponding column (pg. 514, column 2).

Ratakonda et al. discloses the claimed invention except for summing pixel rows to create vertical sums and summing pixel columns to create horizontal sums. Sauer et al. teaches that it was known to perform this calculation. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate the summation method of Sauer et al. to the Integral Projection Method of Ratakonda, since it was well known in the art that such a step is an inherent part of the Integral Projection technique.

Regarding claims 2 and 5, claim 2 is an apparatus claim for an apparatus that performs the method of claim 9, and claim 5 is an apparatus claim for an apparatus that performs the method of claim 10.

10. Claims 3, 4, 6, and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ratakonda et al. in view of Sauer et al. as applied to claims 2 and 5 above, and further in view of US Patent 6,128,047 (Chang et al.). Regarding claim 3, as mentioned above, in Ratakonda et al., the vertical motion is calculated by minimizing the sum of the absolute difference between the source row vectors and the target row average vectors, and regarding claim 6, the horizontal motion is estimated by minimizing the sum of the absolute difference between the source column vectors and the shifted target column vectors (column 5, lines 61-67). However, Ratakonda et al. does not go into detail about the sum of absolute difference (SAD) calculations, or an apparatus that performs these calculations.

Chang et al. discloses a system for determining motion vectors between two video frames with integral projection. Regarding claims 3 and 6, figure 12 shows a processor in an embodiment of Chang et al. This processor contains processor element array 1220, which comprises an array of processor elements 1225, which include subtraction and adder units for SAD calculation (column 14, lines 6-13). Regarding claim 4, searching for the x-coordinate of a motion vector is performed from vertical projections (column 10, lines 34-37). The current block is compared to a series of candidate blocks to find the best match. If the difference between a candidate block is less than that for all previously searched candidate blocks, the current candidate block is considered the "best" block (column 10, lines 17-20). This difference is calculated according to the Sum of the Absolute Differences between the vertical

projection of the current block and the vertical projection of the candidate block, over the search range (column 10, lines 39-50). Regarding claim 7, similarly, the best-match block in the vertical direction is calculated according to the minimized Sum of Absolute Differences between the horizontal projection of the current block and the candidate block (column 11, line 41–column 12, line 34).

Ratakonda et al. in combination with Sauer et al. disclose the claimed invention except for details of SAD calculation. Chang et al. teaches that it was known to determine the best match block to a current block between frames by minimizing SAD values according to integral projection. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to search for matching blocks from minimized SAD values from integral projection as taught by Chang et al., since Chang et al. states in column 2, line 49 to column 3, line 47 that such a technique is faster and uses less computations than traditional “full-search” block matching.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US Patent 6,072,905 A (Cucchi et al.), US Patent 6,480,629 B1 (Bakhmutsky), “A Fast Block Matching Algorithm Using Integral Projection” (Lee et al.), and “A Fast Feature-Based Block Matching Algorithm Using Integral Projections” (Kim et al.) all describe variations of motion estimation from block matching based on IPM.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David N. Werner whose telephone number is (571) 272-9662. The examiner can normally be reached on Monday-Friday from 8:30 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571) 272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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TC 2600